

Service Guide

1451/LR

/G4



High Resolution
Color Monitor



CTX

The Monitor Specialists

No. SG-0003
Edition 1.A
Jun.. 1993

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Monitor adjustments contained in this section should be followed whenever a major component, such as a CRT/YOKE assembly or a circuit board, is replaced. Some adjustments may also be required periodically to correct for component aging. Adjustments should be done in specific order as given in the following paragraphs.

1. Power Supply Circuit

- (1) VR101 +95V Adjustment

2. Horizontal Deflection Circuit

- (1) VR321 H-F/V Adjustment
- (2) VR702,703 H-Center (CC) Adjustment
- (3) VR202 H-Hold Adjustment 1
- (4) VR203 H-Hold Adjustment 2
- (5) VR205,241 H-Width Adjustment

3. Vertical Deflection Circuit

- (6) VR804 Side-Pin Adjustment 1
- (7) VR803 Side-Pin Adjustment 2
- (8) VR801 V-Linear Adjustment
- (9) VR802 Side-Pin Adjustment 3
- (10) VR331 V-Size Adjustment

4. Video Circuit

- (11) VR601 R Subbright Adjustment
- (12) VR602 G Subbright Adjustment
- (13) VR603 B Subbright Adjustment
- (14) VR611 R Bias Adjustment
- (15) VR612 G Bias Adjustment
- (16) VR613 B Bias Adjustment

Receive a full screen in white pattern with brightness at 20 ft-L, before adjusting the monitor.

1. Power Supply Voltage Check

When the monitor is working normally, the voltages at plug P203 on main board are as follows:

- V1 12V \pm 0.5V for deflection IC & preamp
- V2 6.3 for heater
- V4 95V for video O/P
- V3 -45V for G1
- V5 Gnd

- (1) Receive mode 7 signal with full white pattern
- (2) Adjust VR101 to obtain 95V \pm 0.5V

2. Sync and deflection Circuit

2.1 Horizontal Frequency Conversion Circuit

- (1) Receive fh= 40KHz signal with full screen in white pattern.
- (2) Measure the voltage on TP10 and record it.
- (3) Adjust VR321 to make the voltage of TP8 same as of TP10.

2.2 Horizontal Oscillation

- (1) Receive mode 3 signal with cross hatch pattern.
- (2) Use the clamp to ground TP1.
- (3) Adjust VR203 to hold the picture or scroll it slowly toward left or right.
- (4) Receive mode 8 signal with cross hatch pattern.
- (5) Adjust VR202 to hold the picture or scroll it slowly toward left or right.
- (6) Discharge the clamp, and check whether the monitor picture is steady while receiving display modes range from standard VGA up to 8514A. If not repeat procedures (1) through (5) more carefully.

2.3 High Voltage Circuit

- (1) Receive mode 3 signal with full screen.
- (2) Adjust VR401 to obtain 25KV of CRT Anode High Voltage.

2.4 Horizontal Center

- (1) Receive mode 3 signal with cross hatch.
- (2) Adjust the H-PHASE VR to center the picture on screen.
- (3) Receive mode 5 signal with full cross hatch.
- (4) Adjust VR702 to center the picture on screen.
- (5) Receive mode 8 signal with full cross hatch.
- (6) Adjust VR703 to center the picture on screen.

2.5 Horizontal Size

- (1) Receive mode 7 signal with cross hatch pattern.
- (2) Adjust the external H-Size VR to the maximum.
- (3) Adjust VR241 to arrive H-Size at 270mm.
- (4) Adjust VR205 to make mode 3 and mode 8 with the same H-Size.

2.6 Vertical Linearity

- (1) Receive mode 8 signal with cross hatch pattern.
- (2) Adjust VR801 make sure each hatch is equal.

2.7 Vertical Size

- (1) Receive mode 3 signal with cross hatch pattern.
- (2) Adjust the external V-Size VR to the minimum.
- (3) Adjust VR331 to obtain 113mm.



2.8 Side Pincushion Correction

- (1) Receive mode 3 with cross hatch pattern.
Adjust VR804 to symmetrize the upper and the under sides.
- (2) Receive mode 3 with cross hatch pattern.
Adjust VR802 to get the best pincushion.
- (3) Receive mode 8 with cross hatch pattern.
Adjust VR803 to get the best pincushion.

3. Video Circuit

Prior to the video circuit adjustment, all sync and deflection circuit adjustments must be completed, and the monitor must have been warmed up for more than 30 minutes.

The Video signal must have 75Ω impedance and correct voltage at the monitor input terminal. Before adjusting, make sure VR611, 612, 613, 601, 602, 603 are preset to the mechanical center position.

3.1 Cut Off Adjustment

- (1) Receive mode 3 signal with a blank pattern (black).
- (2) Turn the screen VR on the FBT counterclockwise to the minimum, then turn it clockwise until the background raster is just visible on the screen.
- (3) Adjust VR611 and VR613 to obtain a gray background raster.
- (4) Adjust the external brightness VR to the central click point.
- (5) Turn the screen VR counterclockwise to the position that the background raster is just diminished.

3.2 White Balance Adjustment

- (1) Receive mode 3 signal with the small blocks pattern.
- (2) Set user contrast control to its maximum and bright control to its minimum.
- (3) Adjust VR601, VR602, VR603 to read CIE coordinate $x=0.28\pm0.015$, $Y=0.311\pm0.015$, by using Minolta Color Analyzer II.

4. Focus Adjustment

- (1) Receive mode 7 signal.
- (2) Set user contrast and bright control at their maximum.
- (3) Adjust focus control on the FBT to make focus of the middle points between the screen center and the four corners to its best. This is to make the focus for the full screen area be even.

TROUBLE SHOOTING



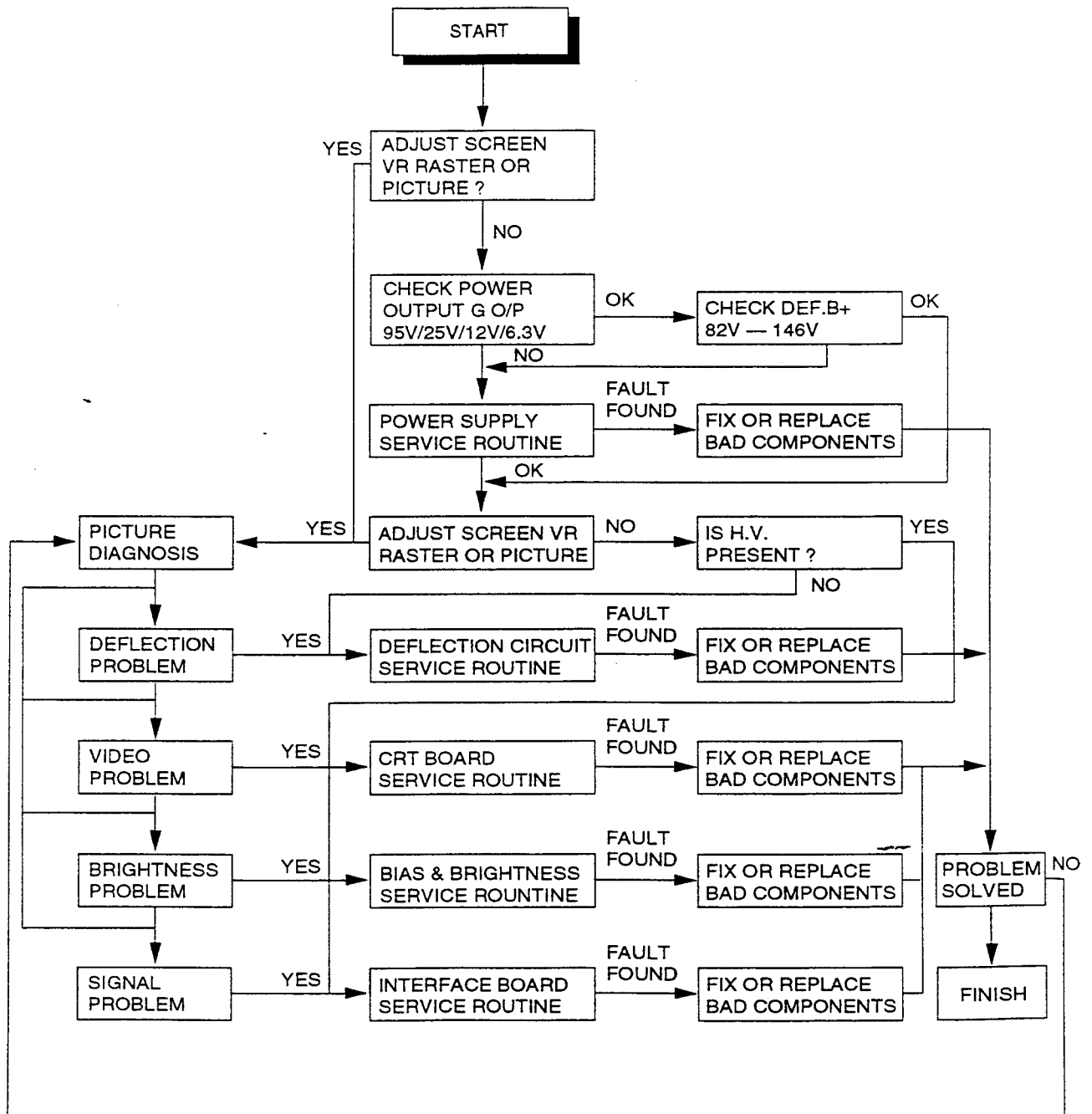
1451/LR

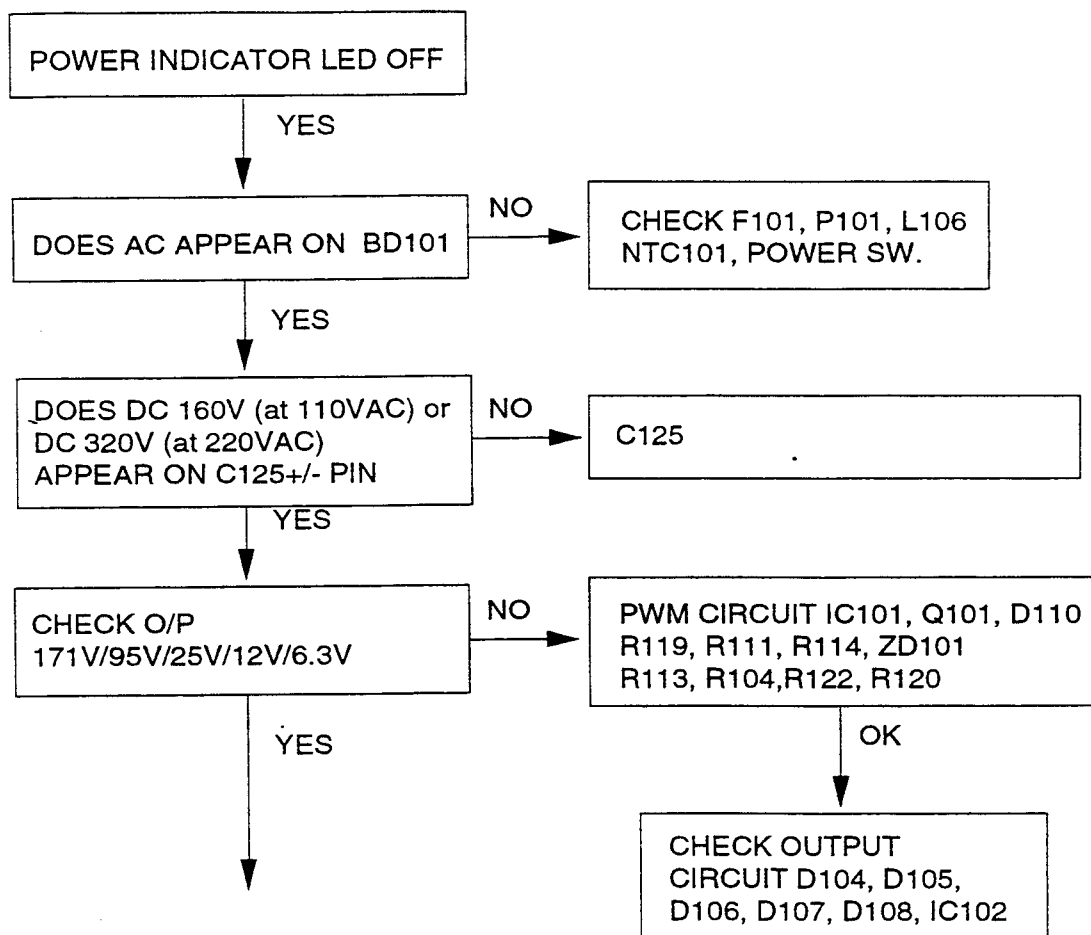
Should trouble shooting be required, service routines are provided on the following pages to facilitate location of a fault. In addition, materials listed below may be helpful while trouble shooting.

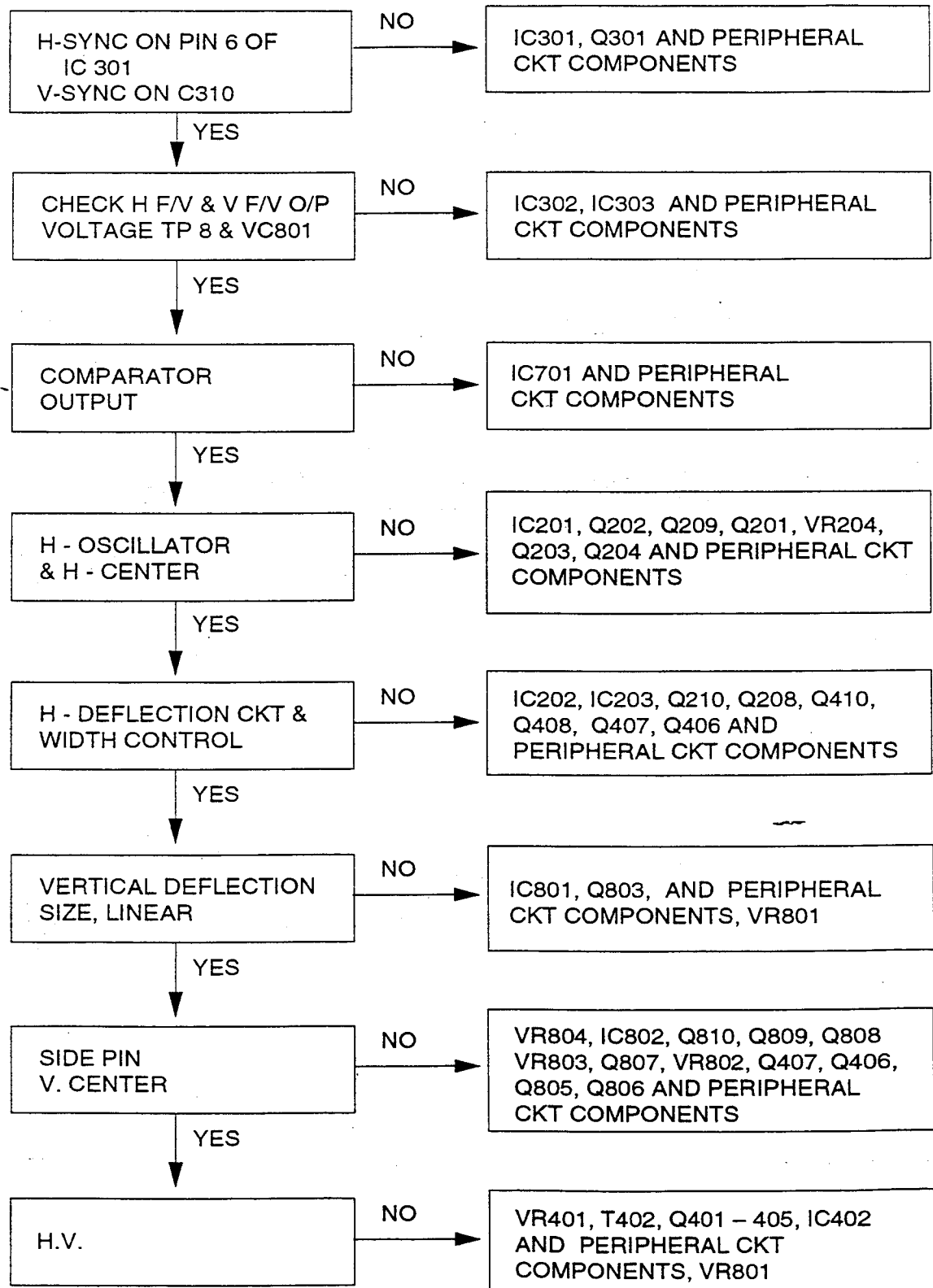
- (1) Description of Circuit
- (2) Basic Circuit Diagram
- (3) Block Diagram



MAIN SERVICE ROUTINE

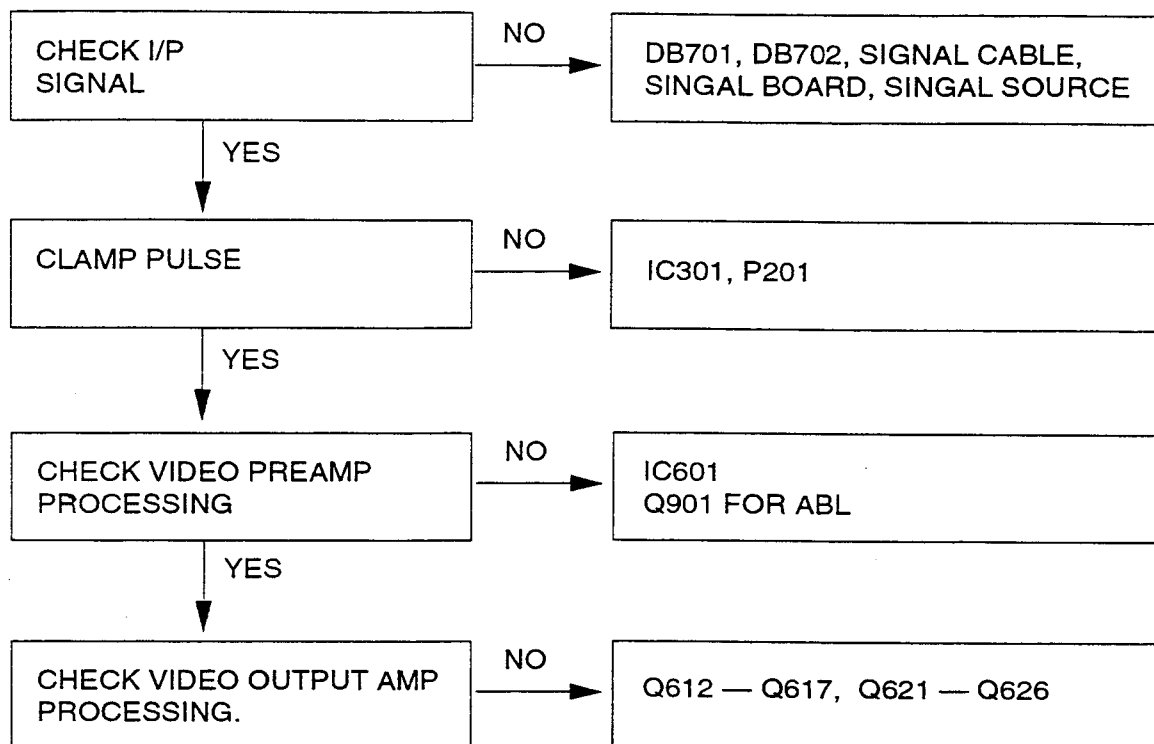


**A. POWER SUPPLY SERVICE ROUTINE**

**B. DEFLECTION CIRCUIT SERVICE ROUTINE**

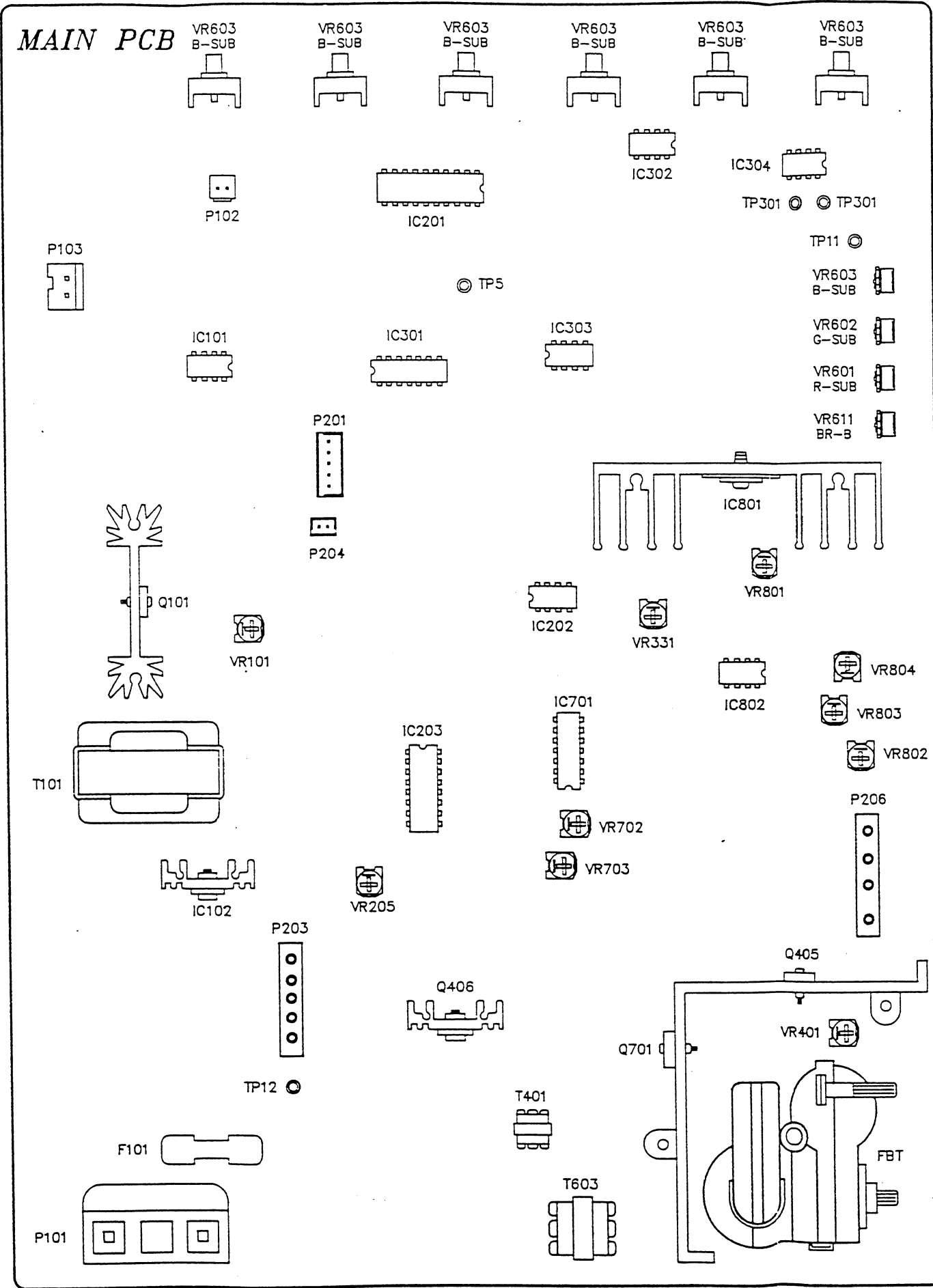


C. VIDEO CIRCUIT SERVICE

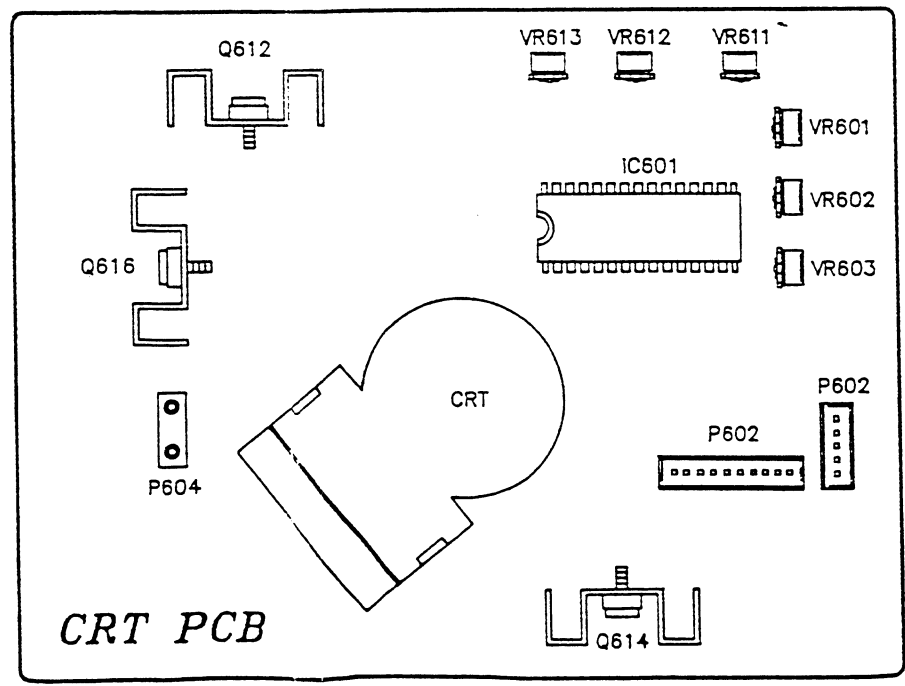
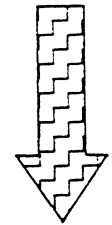
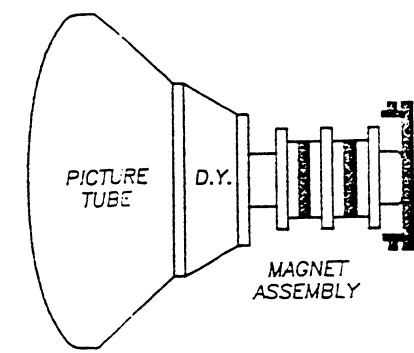


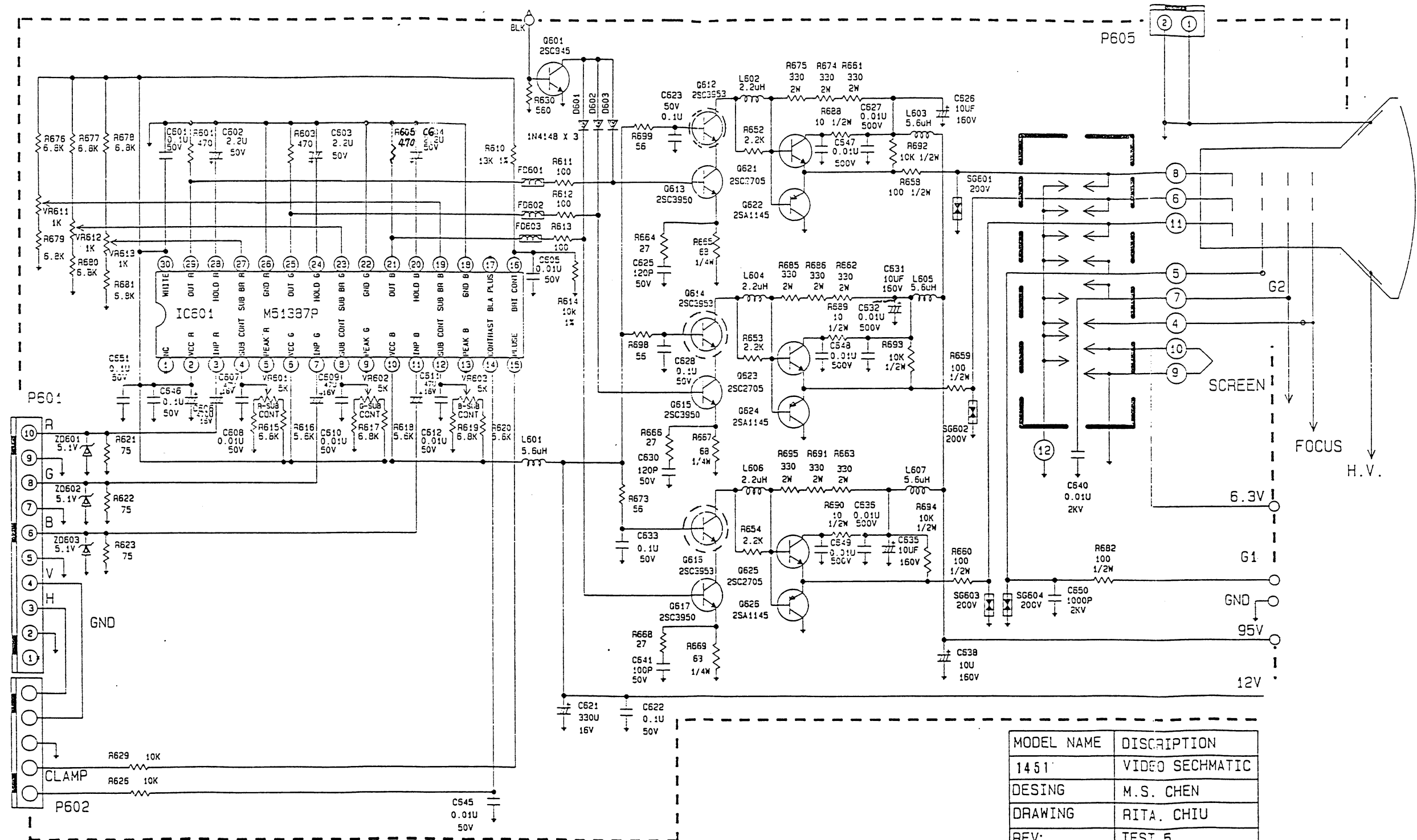
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CMS-1451

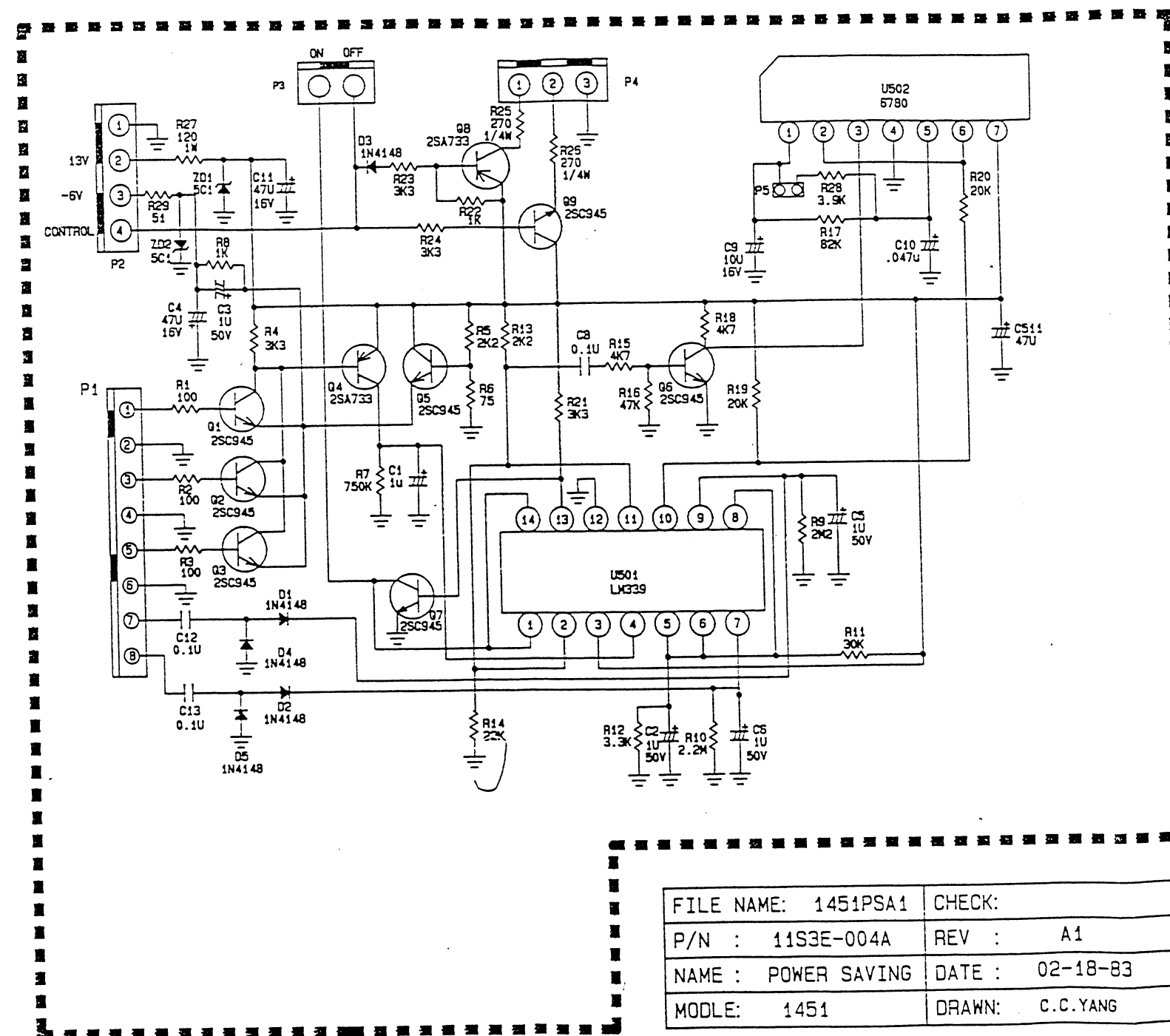




MODEL NAME	DISCRIPTION
1451	VIDEO SECHMATIC
DESING	M.S. CHEN
DRAWING	RITA. CHIU
REV:	TEST 5
DATE	03/11/93

桶時尺寸 之區分 SIZE AREA	容許公差之區分 TOLERANCE AREA							名稱 NAME			材質 MATE'L		
	F	G	H	J	K	L	M	模 樣 MODEL	比例 SCALE	單位 DIM	M/M	處理 FINISHED	
8以下	0.05	0.1	0.15	0.2	0.25	0.3	0.35		/				
8-25	0.08	0.15	0.2	0.25	0.3	0.35	0.4						
25-80	0.12	0.2	0.25	0.3	0.35	0.4	0.45						
80-250	0.25	0.3	0.4	0.45	0.5	0.55	0.6						
250-800	0.5	0.6	0.65	0.7	0.75	0.8	0.85						
800以上	1.0	1.5	2.0	2.5	3.0	3.5	4.0						
								繪圖 DRAWN	設計 DESIGNED	檢圖 CHECKED	承認 APPROVED	數量 QTY	修改 REV.
												料號 PARTS NO	
												直徑	

12號	變更內容	變更者	12號	變更內容	變更者
MARK	REVISED	CONTENT	MARK	REVISED	CONTENT



記號 MARK	變更 REVISED	內容 CONTENT	日期 DATE	記號 MARK	變更 REVISED	內容 CONTENT	日期 DATE

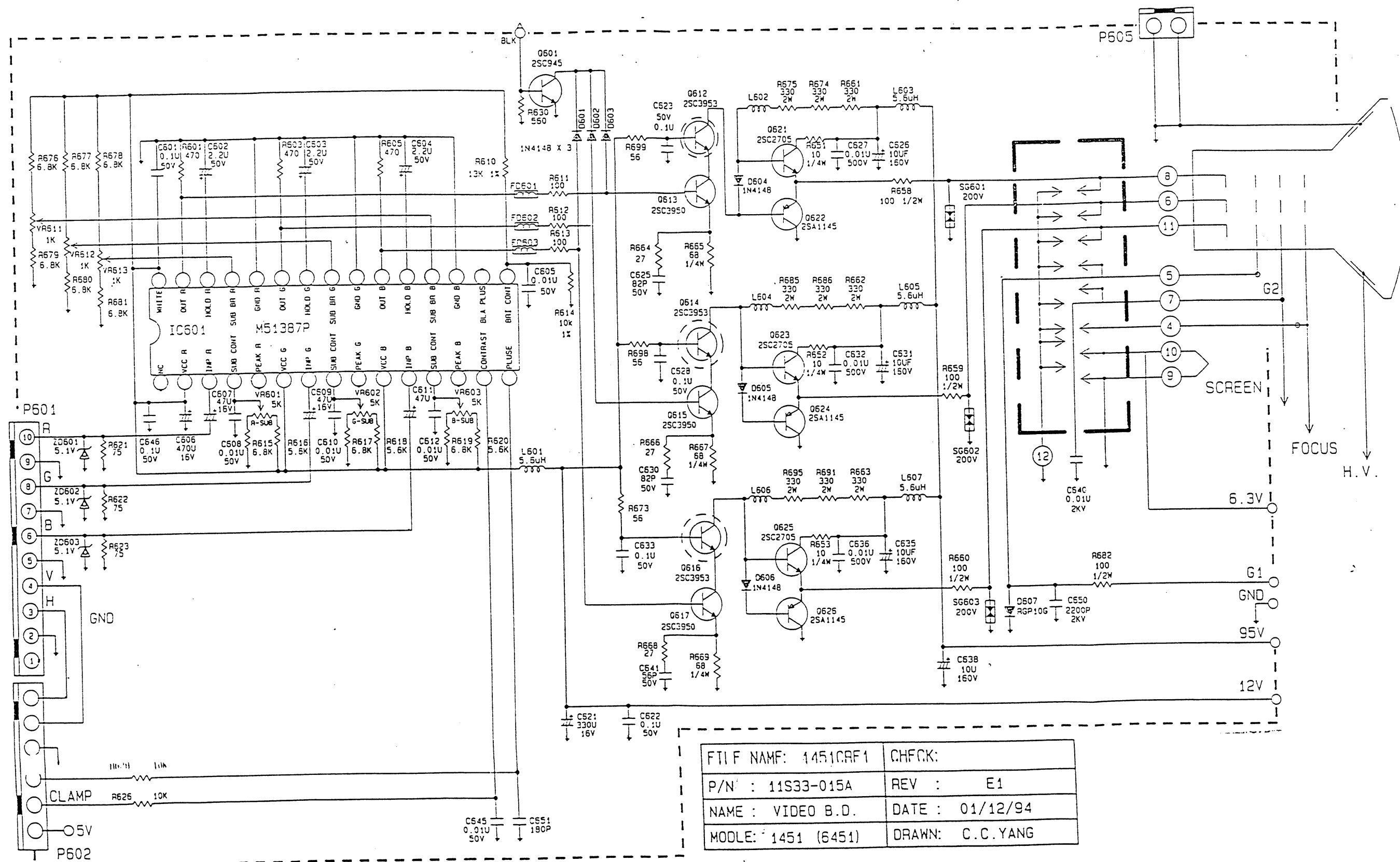
稱呼尺寸 之區分 SIZE AREA	容許公差之區分 TOLERANCE AREA							名稱 NAME	材質 MAT'L
	F	G	H	J	K	L	M	機種 MODEL	處理 FINISHED
8以下	±0.05	±0.1	±0.1	±0.2	±0.2	±0.4	±0.4	比例 SCALE	單位 UNIT
8 25	±0.08	±0.15	±0.15	±0.3	±0.3	±0.6	±0.6	設計 DESIGNED	承認 APPROVED
25 80	±0.12	±0.2	±0.25	±0.4	±0.5	±0.8	±1.0	繪圖 DRAWN	檢圖 CHECKED
80 ~ 250	±0.25	±0.3	±0.4	±0.6	±0.8	±1.2	±1.5		
250 800	±0.5	±0.6	±0.8	±1.0	±1.5	±2.0	±2.5		
800以上	±1.0	±1.5	±2.0	±2.5	±3.0	±4.0	±5.0		

數量
QTY

料號
PARTS NO

備註

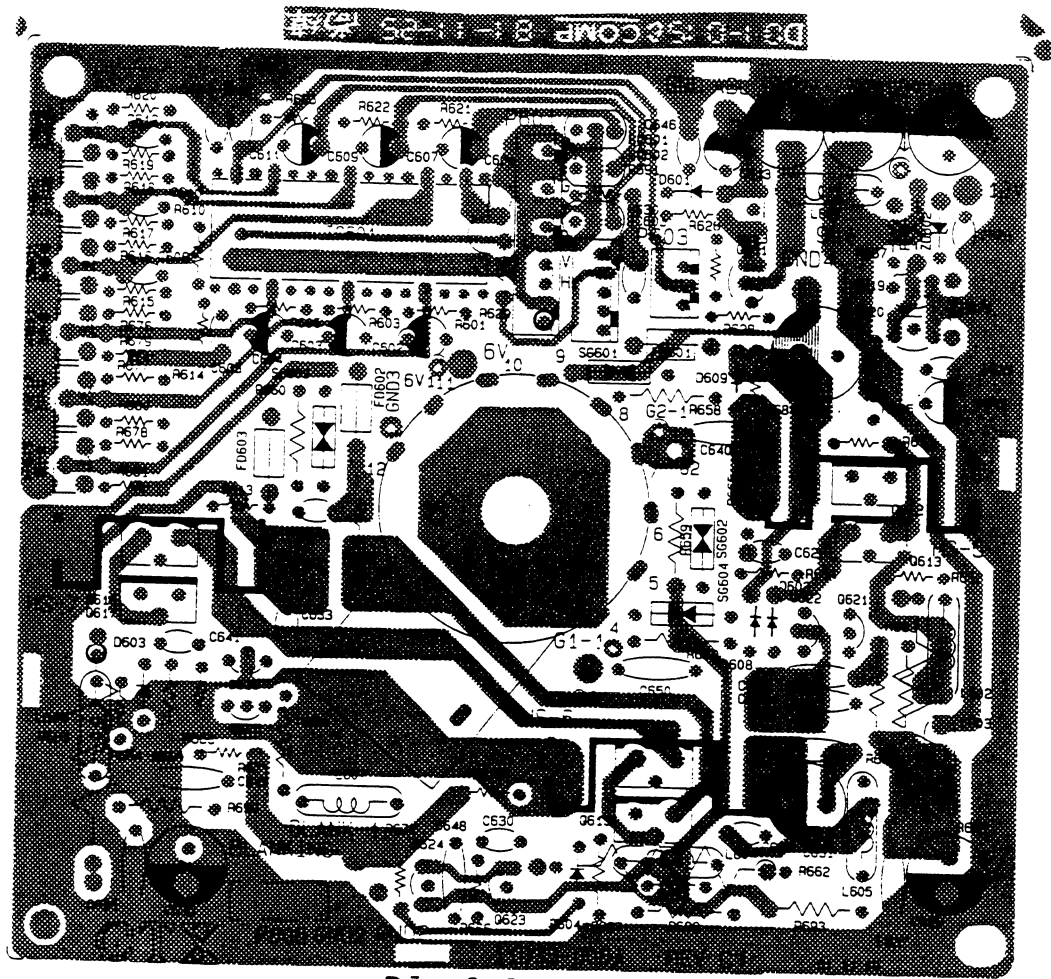
第三角法
THIRD ANGLE PROJ



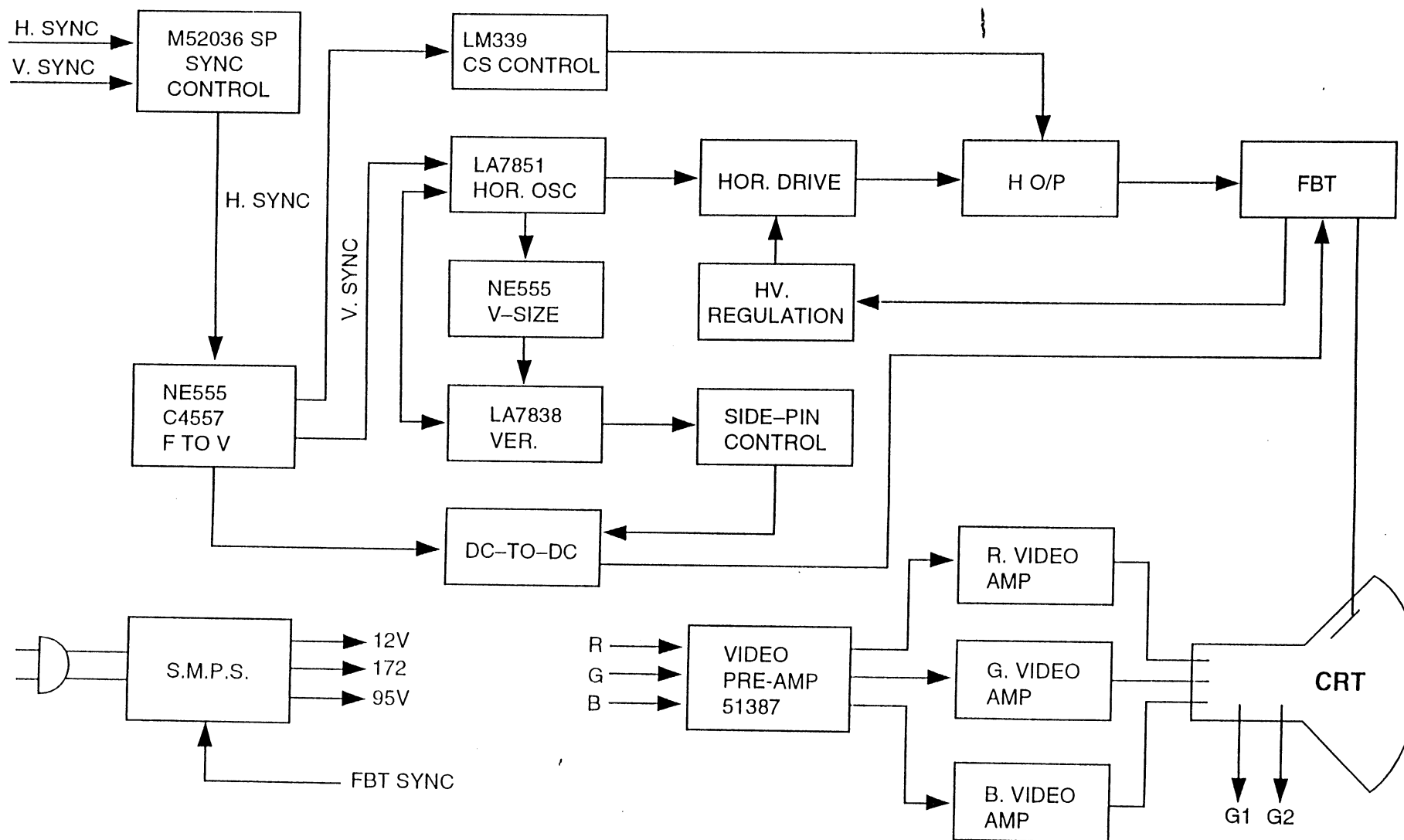
FILE NAME: 1451CRF1	CHECK:
P/N: 11S33-015A	REV: E1
NAME: VIDEO B.D.	DATE: 01/12/94
MODEL: 1451 (6451)	DRAWN: C.C.YANG

稱呼尺寸 之區分 SIZE AREA	容許公差之區分 TOLERANCE AREA							名稱 NAME				材質 MATERIAL				
	F	G	H	J	K	L	M	機種 MODEL				處理 FINISHED				
8以下	0.01	0.01	0.01	0.02	0.02	0.04	0.04	比例 SCALE		DIM	M/M	數量 QTY	修改 REV.			
8—25	0.02	0.02	0.03	0.03	0.03	0.03	0.03	繪圖 DRAWN	設計 DESIGNED	檢查 CHECKED	承認 APPROVED	料號 PARTS NO.				
25—80	0.03	0.03	0.04	0.04	0.04	0.04	0.04									
80—250	0.04	0.04	0.04	0.04	0.04	0.04	0.04									
250—800	0.05	0.05	0.05	0.05	0.05	0.05	0.05									
800以上	0.06	0.06	0.05	0.07	0.06	0.06	0.06									

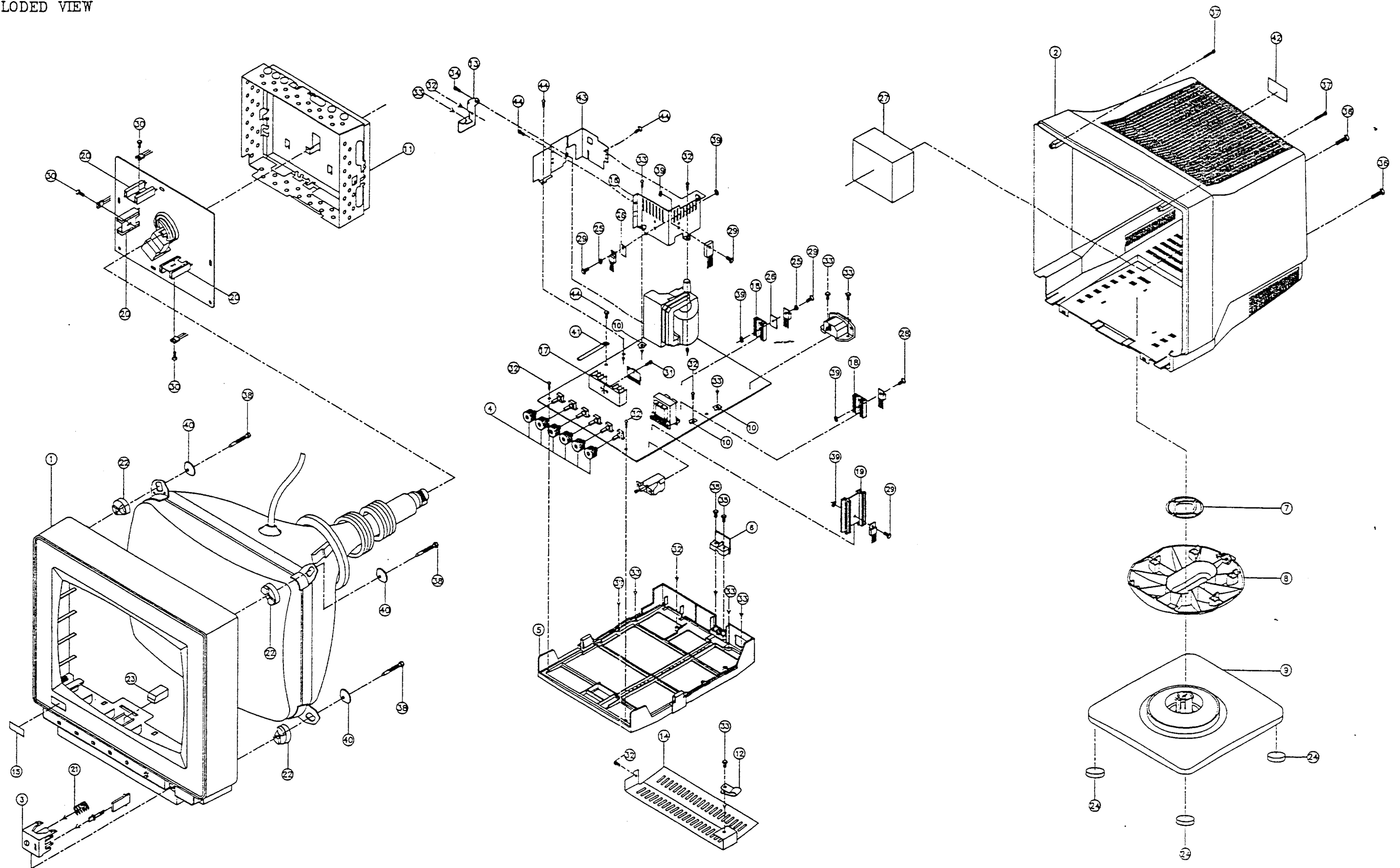
記號	內容	記號	內容
MARK	CONTENT	MARK	CONTENT
REVISED	...	REVISED	...
CHANGED BY	...	CHANGED BY	...



1451/LR BLOCK DIAGRAM



EXPLODED VIEW



Replacement Parts List

Product Safety Note: Components marked with a "!" have special characteristics important to safety. Before replacing any of these components, read carefully, the Product Safety Notice of this Service Manual. Don't degrade the safety of the monitor through improper servicing.

Abbreviations: Capacitors.....EL: Electrolytic Aluminum, TA: Tantalum, CE: Ceramic
 PP: Polypropylene, PEI: Polyester(Inductive), PEN:Polyester (Non-Inductive)
 MPE: Polyester Metalized, MPP: Polypropylene Metalized.
 Resistors..... CF: Carbon Film, MF: Metal Film, VR: Variable Resistor.
 Semiconductor..... TR: Transistor, DI: Diode, ZD: Zener Diode, IC: IC.

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
TRANSISTORS			Q624	14A93-011A	TR PNP 2SA1145
! Q101	14K22-090P	TR MOS FET 2SK1118	Q625	14C93-011A	TR NPN 2SC2705
Q201	14C92-111B	TR NPN 2SC945	Q626	14A93-011A	TR PNP 2SA1145
Q202	14A92-021B	TR PNP 2SA733P/Q	! Q701		CRT DEPENDENT PARTS
Q208	14A92-021B	TR PNP 2SA733P/Q	! Q701		CRT DEPENDENT PARTS
Q209	14C92-111B	TR NPN 2SC945	! Q702	14C26-040B	TR NPN 2SC2688K
Q210	14A92-021B	TR PNP 2SA733P/Q	Q703	14K22-110W	TR MOS FET IRF630/890
Q211	14C92-111B	TR NPN 2SC945	Q704	14K22-110W	TR MOS FET IRF630/890
Q211	14C92-201D	TR NPN 2SC1473Q/R	Q706	14A92-021B	TR PNP 2SA733P/Q
Q212	14C92-111B	TR NPN 2SC945	Q707	14A92-021B	TR PNP 2SA733P/Q
Q212	14C92-201D	TR NPN 2SC1473Q/R	Q708	14C92-111B	TR NPN 2SC945
Q213	14C92-111B	TR NPN 2SC945	Q709	14A92-061D	TR PNP 2SA1018Q/R
Q213	14C92-201D	TR NPN 2SC1473Q/R	Q801	14C92-111B	TR NPN 2SC945
Q301	14C92-111B	TR NPN 2SC945	Q802	14A92-021B	TR PNP 2SA733P/Q
! Q401	14A92-021B	TR PNP 2SA733P/Q	Q803	14C92-111B	TR NPN 2SC945
! Q402	14C92-111B	TR NPN 2SC945	Q804	14A92-021B	TR PNP 2SA733P/Q
! Q403	14A92-021B	TR PNP 2SA733P/Q	Q805	14C92-101B	TR NPN 2SC2001K
! Q404	14A92-071B	TR PNP 2SA952	Q806	14A92-071B	TR PNP 2SA952
! Q406	14D22-100C	TR NPN 2SD386A	Q807	14C92-111B	TR NPN 2SC945
! Q407	14C93-011A	TR NPN 2SC2705	Q808	14C92-111B	TR NPN 2SC945
Q407	14C93-011A	TR NPN 2SC2705	Q809	14C92-111B	TR NPN 2SC945
Q408	14C92-111B	TR NPN 2SC945	Q810	14C92-111B	TR NPN 2SC945
Q409	14A92-021B	TR PNP 2SA733P/Q	Q811	14C92-111B	TR NPN 2SC945
! Q410	14K22-110W	TR MOS FET IRF630/890	Q901	14A92-021B	TR PNP 2SA733P/Q
Q612	14C26-160C	TR NPN 2SC3953	DIODE		
Q613	14C26-150C	TR NPN 2SC3950	! D101	15S49T200F	DI HI SW 1A 1000V 75NS
Q614	14C26-160C	TR NPN 2SC3953	! D102	15S33T201F	DI MD SW 1A 200V
Q615	14C26-150C	TR NPN 2SC3950	D104	15S39T301F	DI MD SW 1.5A 1000V
Q616	14C26-160C	TR NPN 2SC3953	D105	15S49TK00F	DI HI SW 2.3A 1000V 75NS
Q617	14C26-150C	TR NPN 2SC3950	D106	15S39T301F	DI MD SW 1.5A 1000V
Q621	14C93-011A	TR NPN 2SC2705	D107	15S33T401F	DI MD SW 2A 200V
Q622	14A93-011A	TR PNP 2SA1145	D108	15S33T401F	DI MD SW 2A 200V
Q623	14C93-011A	TR NPN 2SC2705			



NO.	PARTS NUMBER	DESCRIPTION	Q'TY	NO.	PARTS NUMBER	DESCRIPTION	Q'TY
01	0820105050	FRONT PANEL	1	33	6724F30120	TAPPING SCREW (T3X12)	4
02	0800106050	BACK CABINET	1	34	6724235080	TAPPING SCREW (T3.5X8)	1
03	7112110050	POWER KNOB	1	35	6722440100	TAPPING SCREW (T4X10)	2
04	7903431050	VR KNOB	6	36	6722240140	TAPPING SCREW (T4X14)	2
05	7901267000	P.C.B. FRAME	1	37	6722440180	TAPPING SCREW (T4X18)	2
06	7902111000	CABLE BUSHING (TOP)	1	38	6774620140	SPECIAL SCREW	4
07	0813432350	SWIVEL DISK	1	39	6740030240	NUT HEX (M3)	5
08	0811269350	SWIVEL BOWL	1	40	7464616450	WASHER	4
09	0831268350	SWIVEL BASE	1	41	7146250400	NAME PLATE	1
10	7636160000	GROUND PLATE	3	42	714620950L	FCC OVERLAY	1
11	7502119600	SHIELD COVER	1		*714624880L	FCC OVERLAY	1
12	7635988440	CABLE CLAMP	1	43	*7502118600	SHIELD COVER	1
13	7626159000	FBT BRACKET	1	44	*6724A30100	TAPPING SCREW (T3X10)	3
14	7512113000	BOTTOM PLATE	1	45			
15	8204577010	CLAMP	1	46			
16	7512114200	HEAT SINK	1	47			
17	7515169200	HEAT SINK	1	48			
18	7515656230	HEAT SINK	2	49			
19	7515189200	HEAT SINK	1	50			
20	7515657600	HEAT SINK	3	51			
21	7316206250	POWER SPPING	1	52			
22	7415610340	CRT SPACER	4	53			
23	7416133440	RUBBER PAD	1	54			
24	7415566320	RUBBER FOOT	4	55			
25	7904451000	INSULATING SLEEVING	2	56			
26	7414452000	S.R. (18X13mm)	2	57			
27	7425910120	CAUSHION PLT (50X70X35t)	1	58			
28	6720430080	MACHINE SCREW M3X8	1	59			
29	6720430100	MACHINE SCREW M3X10	4	60			
30	6724426060	TAPPING SCREW (T2.6X6)	3	61			
31	6724430080	TAPPING SCREW (T3X8)	1	62			
32	6724A30100	TAPPING SCREW (T3X10)	6	63			

Mark: " * " For LR Model Used Only

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
! D110	15S11M001F	DI SW 1N4148	D810	15S11M001F	DI SW 1N4148
! D111	15S49T200F	DI HI SW 1A 1000V 75NS	D901	15S11M001F	DI SW 1N4148
! D112		CRT DEPENDENT PARTS			
D201	15S11M001F	DI SW 1N4148	ZENER DIODES		
D202	15S11M001F	DI SW 1N4148	! ZD101	15Z33M1800	ZD 18V 5% 0.5W
! D203	15S11M001F	DI SW 1N4148	! ZD102	15Z33M5190	ZD 5.1V 5% 0.5W
D204	15S11M001F	DI SW 1N4148	! ZD201	15Z33M8290	ZDI 8.2V 5% 0.5W
D205	15S11M001F	DI SW 1N4148	ZD202	15Z33M5190	ZD 5.1V 5% 0.5W
D209	15S35T201F	DI MD SW 1A 400V	ZD253	15Z33M5190	ZD 5.1V 5% 0.5W
D210	15S11M001F	DI SW 1N4148	ZD301	15Z33M5190	ZD 5.1V 5% 0.5W
D211	15S33T201F	DI MD SW 1A 200V	ZD601	15Z33M1500	ZD 15V 5% 0.5W
D242	15S11M001F	DI SW 1N4148	ZD601	15Z33M5190	ZD 5.1V 5% 0.5W
D301	15S11M001F	DI SW 1N4148	ZD602	15Z33M5190	ZD 5.1V 5% 0.5W
D302	15S11M001F	DI SW 1N4148	ZD603	15Z33M5190	ZD 5.1V 5% 0.5W
D303	15S11M001F	DI SW 1N4148	ZD701	15Z33M1200	ZD 12V 5% 0.5W
D304	15S11M001F	DI SW 1N4148	ZD802	15Z33M2000	ZD 20V 5% 0.5W
D341	15S11M001F	DI SW 1N4148	ZD803	15Z33M5690	ZD 5.6V 5% 0.5W
! D401	15S65M201F	DI 1N4004			
D402	15S47TK00F	DI HI SW 2.3A 600V 30NS	INTEGRATED CIRCUITS		
D402	46R00-0140	COIL RE BRH 4.6*4.3*1.5	! IC101	17A06-150H	IC LINEAR 3842/17384
D402	46R00-0140	COIL RE BRH 4.6*4.3*1.5	IC102	17A07-010H	IC REGULATR 7812
D403	15S11M001F	DI SW 1N4148	! IC201	17A06-140H	IC LINEAR 7851
D404	15S11M001F	DI SW 1N4148	IC202	17A11-020H	IC LINEAR 4557
D604	15S11M001F	DI SW 1N4148	IC203	16T16-003R	IC TTL 74LS123
D605	15S11M001F	DI SW 1N4148	IC301	16T14-012R	IC TTL 74LS86
D606	15S11M001F	DI SW 1N4148	IC302	17A08-030T	IC LINEAR NE555N
D701	15S11M001F	DI SW 1N4148	IC303	17A08-030T	IC LINEAR NE555N
D702	15S11M001F	DI SW 1N4148	IC304	17A11-020H	IC LINEAR 4557
D703	15S11M001F	DI SW 1N4148	IC402	17A07-030H	IC LINEAR TL431
D705	15S35T201F	DI MD SW 1A 400V	IC601	17A04-020H	IC LINEAR VIDEO M51387P
! D706	15S65M201F	DI 1N4004	IC701	17A11-010H	IC LINEAR LM339
D707	15S11M001F	DI SW 1N4148	IC801	17A06-130H	IC LINEAR 7838
D708	15S65M201F	DI 1N4004	IC802	17A11-020H	IC LINEAR 4557
D709	15S65M201F	DI 1N4004			
D710	15S11M001F	DI SW 1N4148	RESISTORS		
D711	15S11M001F	DI SW 1N4148	! R101	22225-474M	CF 470K 5% 1/4W
D712	15S11M001F	DI SW 1N4148	! R102	24765-3031	CEMENT 30K 5% 5W
D713	15S11M001F	DI SW 1N4148	! R103	22225-150M	CF 15R 5% 1/4W
D714	15S11M001F	DI SW 1N4148	! R104	23755-363D	MOF 36K 5% 2W
D801	15S11M001F	DI SW 1N4148	! R105	22215-393M	CF 39K 5% 1/8W
D802	15S62M201F	DI 1N4002	! R106	22215-472M	CF 4K7 5% 1/8W
D803	15S11M001F	DI SW 1N4148	! R107	22215-474M	CF 470K 5% 1/8W
D804	15S11M001F	DI SW 1N4148	! R108	22225-433M	CF 43K 5% 1/4W
D805	15S11M001F	DI SW 1N4148	! R110	22215-101M	CF 100R 5% 1/8W
D806	15S11M001F	DI SW 1N4148			
D807	15S11M001F	DI SW 1N4148			
D808	15S11M001F	DI SW 1N4148			

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
! R111	22215-271M	CF 270R 5% 1/8W	R248	22215-134M	CF 130K 5% 1/8W
! R112	22225-103M	CF 10K 5% 1/4W	R248	22215-473M	CF 47K 5% 1/8W
! R113	22215-101M	CF 100R 5% 1/8W	R249	22215-103M	CF 10K 5% 1/8W
! R114	23755-2284	MOF 0.22R 5% 2W	R250	22225-473M	CF 47K 5% 1/4W
! R117	22225-682M	CF 6K8 5% 1/4W	R251	22215-204M	CF 200K 5% 1/8W
! R119	22215-270M	CF 27R 5% 1/8W	R251	22215-474M	CF 470K 5% 1/8W
! R120	22225-101M	CF 100R 5% 1/4W	R252	22215-392M	CF 3K9 5% 1/8W
! R122	23755-363D	MOF 36K 5% 2W	R253	22225-102M	CF 1K 5% 1/4W
R123	23755-2294	MOF 2R2 5% 2W	R254	22245-2211	CF 220R 5% 1/2W
! R124	24775-4711	CEMENT 470R 5% 7W	R255	22215-122M	CF 1K2 5% 1/8W
R125	23255-100A	MOF 10R 5% 2W	R256	22225-103M	CF 10K 5% 1/4W
! R127		CRT DEPENDENT PARTS	R257	22215-222M	CF 2K2 5% 1/8W
! R128	23255-221A	MOF 220R 5% 2W	R258	22215-821M	CF 820R 5% 1/8W
R201	22225-223M	CF 22K 5% 1/4W	R259	22215-912M	CF 9K1 5% 1/8W
R202	22215-123M	CF 12K 5% 1/8W	R260	22215-102M	CF 1K 5% 1/8W
R203	22215-272M	CF 2K7 5% 1/8W	R261	22215-562M	CF 5K6 5% 1/8W
R204	22225-222M	CF 2K2 5% 1/4W	R262	22225-332M	CF 3K3 5% 1/4W
R205	22225-562M	CF 5K6 5% 1/4W	R263	22215-222M	CF 2K2 5% 1/8W
R206	22215-333M	CF 33K 5% 1/8W	R264	22225-222M	CF 2K2 5% 1/4W
R207	22215-471M	CF 470R 5% 1/8W	R265	22215-223M	CF 22K 5% 1/8W
R208	22215-822M	CF 8K2 5% 1/8W	R266	622215-301M	CF 300R 5% 1/8W
R209	22225-562M	CF 5K6 5% 1/4W	R267	22215-512M	CF 5K1 5% 1/8W
R209	22225-912M	CF 9K1 5% 1/4W	R268	22215-102M	CF 1K 5% 1/8W
R210	22215-392M	CF 3K9 5% 1/8W	R269	22245-5611	CF 560R 5% 1/2W
R211	22215-122M	CF 1K2 5% 1/8W	R271	22215-222M	CF 2K2 5% 1/8W
R212	23A11S007M	MF 5K62 1% 1/8W	R272	23A11-183M	MF 18K 1% 1/8W
R214	22215-102M	CF 1K 5% 1/8W	R273	22215-154M	CF 150K 5% 1/8W
R215	522215-102M	CF 1K 5% 1/8W	R301	22225-222M	CF 2K2 5% 1/4W
R216	22215-203M	CF 20K 5% 1/8W	R303	22215-331M	CF 330R 5% 1/8W
R217	22215-203M	CF 20K 5% 1/8W	R304	22215-221M	CF 220R 5% 1/8W
! R218	22215-472M	CF 4K7 5% 1/8W	R305	22215-821M	CF 820R 5% 1/8W
! R219	22215-242M	CF 2K4 5% 1/8W	R306	22215-331M	CF 330R 5% 1/8W
! R220	22215-102M	CF 1K 5% 1/8W	R307	22225-471M	CF 470R 5% 1/4W
R221	22215-223M	CF 22K 5% 1/8W	R308	22215-471M	CF 470R 5% 1/8W
R222	22215-124M	CF 120K 5% 1/8W	R309	22215-821M	CF 820R 5% 1/8W
R223	22215-394M	CF 390K 5% 1/8W	R310	22215-331M	CF 330R 5% 1/8W
R224	22215-153M	CF 15K 5% 1/8W	R311	22245-2211	CF 220R 5% 1/2W
R225	22215-104M	CF 100K 5% 1/8W	R312	22215-102M	CF 1K 5% 1/8W
R226	23A11-222M	MF 2K2 1% 1/8W	R313	22225-821M	CF 820R 5% 1/4W
R227	22225-272M	CF 2K7 5% 1/4W	R320	22215-912M	CF 9K1 5% 1/8W
R241	22215-223M	CF 22K 5% 1/8W	R321	22215-822M	CF 8K2 5% 1/8W
R241	22215-243M	CF 24K 5% 1/8W	R323	22225-103M	CF 10K 5% 1/4W
R243	22215-472M	CF 4K7 5% 1/8W	R324	22245-2711	CF 270R 5% 1/2W
R244	22245-7531	CF 75K 5% 1/2W	R325	23A11-752M	MF 7K5 1% 1/8W
R245	23A11-103M	MF 10K 1% 1/8W	R326	23A11-752M	MF 7K5 1% 1/8W
R246	23A11-103M	MF 10K 1% 1/8W	R331	22215-103M	CF 10K 5% 1/8W
R247	23A11-103M	MF 10K 1% 1/8W	R333	22215-103M	CF 10K 5% 1/8W

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
R334	22245-2711	CF 270R 5% 1/2W	R626	22215-103M	CF 10K 5% 1/8W
R337	22225-683M	CF 68K 5% 1/4W	R629	22215-103M	CF 10K 5% 1/8W
R341	23A21-103M	MF 10K 1% 1/4W	R658	22245-1011	CF 100R 5% 1/2W
R342	23A11S002M	MF 44K2 1% 1/8W	R659	22245-1011	CF 100R 5% 1/2W
R343	23A11-103M	MF 10K 1% 1/8W	R660	22245-1011	CF 100R 5% 1/2W
R344	22215-103M	CF 10K 5% 1/8W	R661	23755-3314	MOF 330R 5% 2W
R345	22215-122M	CF 1K2 5% 1/8W	R662	23755-3314	MOF 330R 5% 2W
R346	22215-479M	CF 4R7 5% 1/8W	R663	23755-3314	MOF 330R 5% 2W
R401	22225-333M	CF 33K 5% 1/4W	R664	22215-470M	CF 47R 5% 1/8W
! R405	22225-152M	CF 1K5 5% 1/4W	R665	22225-680M	CF 68R 5% 1/4W
! R406	22225-152M	CF 1K5 5% 1/4W	R666	22215-470M	CF 47R 5% 1/8W
! R407	22225-682M	CF 6K8 5% 1/4W	R667	22225-680M	CF 68R 5% 1/4W
! R408	22225-821M	CF 820R 5% 1/4W	R668	22215-470M	CF 47R 5% 1/8W
! R409	22225-222M	CF 2K2 5% 1/4W	R669	22225-680M	CF 68R 5% 1/4W
! R410	22225-202M	CF 2K 5% 1/4W	R673	22215-560M	CF 56R 5% 1/8W
R412	22215-752M	CF 7K5 5% 1/8W	R674	23755-3314	MOF 330R 5% 2W
R413	22215-473M	CF 47K 5% 1/8W	R675	23755-3314	MOF 330R 5% 2W
R414	22245-4721	CF 4K7 5% 1/2W	R676	22215-682M	CF 6K8 5% 1/8W
! R415	22215-470M	CF 47R 5% 1/8W	R677	22215-682M	CF 6K8 5% 1/8W
! R416	22225-111M	CF 110R 5% 1/4W	R678	22215-682M	CF 6K8 5% 1/8W
R425	23245-4714	MOF 470R 5% 1W	R679	22215-682M	CF 6K8 5% 1/8W
R426	22215-222M	CF 2K2 5% 1/8W	R680	22215-682M	CF 6K8 5% 1/8W
R427	22215-222M	CF 2K2 5% 1/8W	R681	22215-682M	CF 6K8 5% 1/8W
R428	22215-332M	CF 3K3 5% 1/8W	R682	22245-1011	CF 100R 5% 1/2W
! R429	22215-122M	CF 1K2 5% 1/8W	R685	23755-3314	MOF 330R 5% 2W
! R430	22245-4731	CF 47K 5% 1/2W	R686	23755-3314	MOF 330R 5% 2W
! R431	22245-1041	CF 100K 5% 1/2W	R688	22245-1001	CF 10R 5% 1/2W
! R432	22215-102M	CF 1K 5% 1/8W	R689	22245-1001	CF 10R 5% 1/2W
R433	22225-434M	CF 430K 5% 1/4W	R690	22245-1001	CF 10R 5% 1/2W
R434	23245-1894	MOF 1R8 5% 1W	R691	23755-3314	MOF 330R 5% 2W
R601	22215-471M	CF 470R 5% 1/8W	R692	22245-1031	CF 10K 5% 1/2W
R603	22215-471M	CF 470R 5% 1/8W	R693	22245-1031	CF 10K 5% 1/2W
R605	22215-471M	CF 470R 5% 1/8W	R694	22245-1031	CF 10K 5% 1/2W
R610	23A11-133M	MF 13K 1% 1/8W	R695	23755-3314	MOF 330R 5% 2W
R611	22215-101M	CF 100R 5% 1/8W	R698	22215-560M	CF 56R 5% 1/8W
R612	22215-101M	CF 100R 5% 1/8W	R699	22215-560M	CF 56R 5% 1/8W
R613	22215-101M	CF 100R 5% 1/8W	R702	22215-105M	CF 1M 5% 1/8W
R614	23A11-103M	MF 10K 1% 1/8W	R703	22225-103M	CF 10K 5% 1/4W
R615	22215-682M	CF 6K8 5% 1/8W	R704	22215-562M	CF 5K6 5% 1/8W
R616	22215-562M	CF 5K6 5% 1/8W	R705	22215-562M	CF 5K6 5% 1/8W
R617	22215-682M	CF 6K8 5% 1/8W	R706	22215-103M	CF 10K 5% 1/8W
R618	22215-562M	CF 5K6 5% 1/8W	R707	22215-102M	CF 1K 5% 1/8W
R619	22215-682M	CF 6K8 5% 1/8W	R708	22215-105M	CF 1M 5% 1/8W
R620	22215-562M	CF 5K6 5% 1/8W	R709	22215-563M	CF 56K 5% 1/8W
R621	22215-750M	CF 75R 5% 1/8W	R710	22215-363M	CF 36K 5% 1/8W
R622	22215-750M	CF 75R 5% 1/8W	R711	22215-303M	CF 30K 5% 1/8W
R623	22215-750M	CF 75R 5% 1/8W	R712	22215-683M	CF 68K 5% 1/8W

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
R713	22215-562M	CF 5K6 5% 1/8W	R818	22225-152M	CF 1K5 5% 1/4W
R718	22215-105M	CF 1M 5% 1/8W	R819	22245-5611	CF 560R 5% 1/2W
R719	22215-683M	CF 68K 5% 1/8W	R820	22245-3391	CF 3R3 5% 1/2W
R720	22215-563M	CF 56K 5% 1/8W	R822	22225-333M	CF 33K 5% 1/4W
R721	22215-103M	CF 10K 5% 1/8W	R823	23255-2015	MOF 200R 5% 2W
R726	22215-103M	CF 10K 5% 1/8W	R824	22225-152M	CF 1K5 5% 1/4W
R728	22215-103M	CF 10K 5% 1/8W	R825	22225-220M	CF 22R 5% 1/4W
R729	22245-1511	CF 150R 5% 1/2W	R826	22225-243M	CF 24K 5% 1/4W
R730	22225-202M	CF 2K 5% 1/4W	R827	22215-222M	CF 2K2 5% 1/8W
R731	22215-102M	CF 1K 5% 1/8W	R832	22215-242M	CF 2K4 5% 1/8W
! R732	22245-1031	CF 10K 5% 1/2W	R833	22215-104M	CF 100K 5% 1/8W
! R733	22215-102M	CF 1K 5% 1/8W	R834	22215-474M	CF 470K 5% 1/8W
! R734	23765-1525	MOF 1K5 5% 3W	R835	22225-102M	CF 1K 5% 1/4W
! R735	22245-2701	CF 27R 5% 1/2W	R836	22215-473M	CF 47K 5% 1/8W
! R736	22245-2201	CF 22R 5% 1/2W	R837	22215-622M	CF 6K2 5% 1/8W
R737	22245-4701	CF 47R 5% 1/2W	R838	22225-102M	CF 1K 5% 1/4W
R738	22215-513M	CF 51K 5% 1/8W	R839	22215-103M	CF 10K 5% 1/8W
R739	22245-1041	CF 100K 5% 1/2W	R840	22215-302M	CF 3K 5% 1/8W
R740	22215-205M	CF 2M 5% 1/8W	R841	22215-103M	CF 10K 5% 1/8W
R741	22215-223M	CF 22K 5% 1/8W	R842	22215-391M	CF 390R 5% 1/8W
R742	22215-103M	CF 10K 5% 1/8W	R843	22215-120M	CF 12R 5% 1/8W
R743	22215-512M	CF 5K1 5% 1/8W	R844	22215-120M	CF 12R 5% 1/8W
R744	22215-332M	CF 3K3 5% 1/8W	R846	22215-303M	CF 30K 5% 1/8W
R745	22225-562M	CF 5K6 5% 1/4W	R847	22215-332M	CF 3K3 5% 1/8W
R746	22215-751M	CF 750R 5% 1/8W	R848	23A11-133M	MF 13K 1% 1/8W
R747	22215-103M	CF 10K 5% 1/8W	R849	22215-512M	CF 5K1 5% 1/8W
R748	22215-124M	CF 120K 5% 1/8W	R850	23A21-184M	MF 180K 1% 1/4W
R748	22215-823M	CF 82K 5% 1/8W	R851	22225-111M	CF 110R 5% 1/4W
R749	22245-2421	CF 2K4 5% 1/2W	R902	22225-102M	CF 1K 5% 1/4W
R750	22215-753M	CF 75K 5% 1/8W	R903	22215-752M	CF 7K5 5% 1/8W
R801	22215-103M	CF 10K 5% 1/8W	R904	22215-103M	CF 10K 5% 1/8W
R802	22215-103M	CF 10K 5% 1/8W	VARIABLE RESISTOR		
R803	23A21-333M	MF 33K 1% 1/4W	! VR101	25B20-202B	POT 2KB 0.1W
R804	23A11-363M	MF 36K 1% 1/8W	VR201	25C0E-203B	VR 20KB 0.05W
R805	23A11-144M	MF 140K 1% 1/8W	VR202	25AA0-202B	POT 2KB 0.1W
R806	23A11-123M	MF 12K 1% 1/8W	VR203	25AA0-502B	POT 5KB 0.1W
R807	23A11-333M	MF 33K 1% 1/8W	VR205	25AA0-502B	POT 5KB 0.1W
R808	22215-302M	CF 3K 5% 1/8W	VR206	25C0E-203B	VR 20KB 0.05W
R809	22215-471M	CF 470R 5% 1/8W	VR241	25B20-203B	POT 20KB 0.1W
R810	22215-101M	CF 100R 5% 1/8W	VR321	25AA0-302B	POT 3KB 0.1W
R811	22215-103M	CF 10K 5% 1/8W	VR331	25B20-503B	POT 50KB 0.1W
R812	22215-102M	CF 1K 5% 1/8W	VR401	25B20-203B	POT 20KB 0.1W
R813	22215-683M	CF 68K 5% 1/8W	VR601	25AA0-502B	POT 5KB 0.1W
R814	22215-750M	CF 75R 5% 1/8W	VR602	25AA0-502B	POT 5KB 0.1W
R815	22215-273M	CF 27K 5% 1/8W	VR603	25AA0-502B	POT 5KB 0.1W
R816	22215-392M	CF 3K9 5% 1/8W			
R817	23A31-1291	MF 1R2 1% 1/2W			

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
VR611	25AA0-102B	POT 1KB 0.1W	! C146	31115-103R	PEI 0.01U 5% 50V
VR612	25AA0-102B	POT 1KB 0.1W	C201	38196-390R	CE 39P 10% 50V
VR613	25AA0-102B	POT 1KB 0.1W	C202	30222-1222	PS EPOXY 1200P 2% 50V
VR702	25B20-104B	POT 100KB 0.1W	C203	30222-1022	PS EPOXY 1000P 2% 50V
VR703	25B20-104B	POT 100KB 0.1W	C204	31115-182R	PEI 1800P 5% 50V
VR704		CRT DEPENDENT PARTS	C205	28H67-109R	EL 1U 20% 50V
VR801	25B20-202B	POT 2KB 0.1W	C206	39146-472R	CE 4700P 10% 50V
VR802	25B20-203B	POT 20KB 0.1W	C207	28H67-109R	EL 1U 20% 50V
VR803	25B20-103B	POT 10KB 0.1W	C208	30222-2222	PS EPOXY 2200P 2% 50V
VR804	25B20-202B	POT 2KB 0.1W	C210	28H37-471R	EL 470U 20% 16V
VR805	25C0E-203B	VR 20KB 0.05W	C211	28H37-100R	EL 10U 20% 16V
VR806	25C0E-203B	VR 20KB 0.05W	! C212	28H67-109R	EL 1U 20% 50V
VR901		CRT DEPENDENT PARTS	C213	28H37-470R	EL 47U 20% 16V
CAPACITOR			C214	31115-103R	PEI 0.01U 5% 50V
! C102		CRT DEPENDENT PARTS	C215	31115-103R	PEI 0.01U 5% 50V
! C103	42D57-4725	SAFETY 4700P 20%	C216	31115-1043	PEI 0.1U 5% 50V
! C103	42D77-2224	SAFETY 2200P 20%	C217	28H37-471R	EL 470U 20% 16V
! C104	42D57-4725	SAFETY 4700P 20%	C218	28H67-109R	EL 1U 20% 50V
C104	42D77-2224	SAFETY 2200P 20%	C219	30222-2722	PS EPOXY 2700P 2% 50V
! C106	34175-1034	MPE 0.01U 5% 630V	C220	39146-821R	CE 820P 10% 50V
! C107	39B87C104R	CE 0.1U 20% 50V	C221	28H07-109R	EL 1U 20% 160V
! C109	31115-222R	PEI 2200P 5% 50V	C230	31115-153R	PEI 0.015 5% 50V
! C110	39B87C104R	CE 0.1U 20% 50V	C231	39B87C104R	CE 0.1U 20% 50V
! C111	31115-222R	PEI 2200P 5% 50V	C242	28H37-470R	EL 47U 20% 16V
! C113	31115-103R	PEI 0.01U 5% 50V	C243	39146-103R	CE 0.01U 10% 50V
! C114	42D77-2224	SAFETY 2200P 20%	C244	28H67-109R	EL 1U 20% 50V
! C115	42D77-2224	SAFETY 2200P 20%	C245	39B87C104R	CE 0.1U 20% 50V
C116	283A7-4701	EL 47U 20% 200V	C251	28H37-471R	EL 470U 20% 16V
C117	28H07-2215	EL 220U 20% 160VB	C252	28467-109R	EL 1U 20% 50V
C118	28H57-4711	EL 470U 20% 35V	C253	39146-102R	CE 1000P 10% 50V
C119	28H47-4711	EL 470U 20% 25V	C254	31115-222R	PEI 2200P 5% 50V
C120	28H37-331R	EL 330U 20% 16V	C255	39B87C104R	CE 0.1U 20% 50V
C121	28H37-1021	EL 1000U 20% 16V	C256	31115-682R	PEI 6800P 5% 50V
! C122	28H47-101R	EL 100U 20% 25V	C257	39146-472R	CE 4700P 10% 50V
! C125	28ED7-2216	EL 220U 20% 400V	C258	30222-2212	PS EPOXY 220P 2% 50V
C126		CRT DEPENDENT PARTS	C259	39B87C104R	CE 0.1U 20% 50V
C127	283A7-4701	EL 47U 20% 200V	C261	39146-101R	CE 100P 10% 50V
C128	39487-1038	CE 0.01U 20% 500V	C262	39B87C104R	CE 0.1U 20% 50V
C129	39487-1038	CE 0.01U 20% 500V	C301	28H37-100R	EL 10U 20% 16V
C131	39B87C104R	CE 0.1U 20% 50V	C302	28H37-470R	EL 47U 20% 16V
C132	28H57-4711	EL 470U 20% 35V	C303	28H37-221R	EL 220U 20% 16V
! C133	39446-561R	CE 560P 10% 500V	C309	39146-101R	CE 100P 10% 50V
C134	39146-472R	CE 4700P 10% 50V	C310	28H37-100R	EL 10U 20% 16V
C135	39446-472R	CE 4700P 10% 500V	C321	28H37-470R	EL 47U 20% 16V
! C140	39146-101R	CE 100P 10% 50V	C322	39146-103R	CE 0.01U 10% 50V
			C323	33125-1024	PP 1000P 5% 100V
			C324	28H67-109R	EL 1U 20% 50V

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
C325	39B87C104R	CE 0.1U 20% 50V	C646	39B87C104R	CE 0.1U 20% 50V
C331	28H37-470R	EL 47U 20% 16V	C650	39546-222R	CE 2200P 10% 1KV
C332	39146-103R	CE 0.01U 10% 50V	C650	39646-1017	CE 100P 10% 2KV
C333	31115-1043	PEI 0.1U 5% 50V	C651	39146-391R	CE 390P 10% 50V
C341	28467-109R	EL 1U 20% 50V	C701	28H37-470R	EL 47U 20% 16V
C342	28H37-101R	EL 100U 20% 16V	C702	39146-103R	CE 0.01U 10% 50V
C404	39146-103R	CE 0.01U 10% 50V	C704	39B87C104R	CE 0.1U 20% 50V
C405	28H67-339R	EL 3U3 20% 50V	C706	35145-1846	MPP 0.18U 5% 250V
C406	28H57-4711	EL 470U 20% 35V	C707	39B87C104R	CE 0.1U 20% 50V
C407	28H67-478R	EL 0.47U 20% 50V	C708	35145-2746	MPP 0.27U 5% 250V
C408	28H67-479R	EL 4U7 20% 50V	C709	35155-3947	MPP 0.39U 5% 400V
C410	39B87C104R	CE 0.1U 20% 50V	C710	39446-272R	CE 2700P 10% 500V
C412	28H57-101R	EL 100U 20% 35V	C711	283A7-4791	EL 4U7 20% 200V
C414	39B87C104R	CE 0.1U 20% 50V	C711	28HB7-479R	EL 4U7 20% 250V
C416	39146-102R	CE 1000P 10% 50V	C712	39446-471R	CE 470P 10% 500V
C417	28HB7-1015	EL 100U 20% 250V	C713	28H07-109R	EL 1U 20% 160V
C418	39146-221R	CE 220P 10% 50V	C715	375A5-6827	PPS 6800P 5% 1.6KV
C420	283A7-4701	EL 47U 20% 200V	C716	375B5-3327	PPS 3300P 5% 2KV
C601	39B87C104R	CE 0.1U 20% 50V	C717	37585-1537	PPS 0.015U 5% 1KV
C602	28H67-229R	EL 2U2 20% 50V	C718	39146-821R	CE 820P 10% 50V
C603	28H67-229R	EL 2U2 20% 50V	C719	35145-1044	MPP 0.1U 5% 250V
C604	28H67-229R	EL 2U2 20% 50V	C720	35155-1847	MPP 0.18U 5% 400V
C605	39147-103R	CE 0.01U 20% 50V	C721	28HA7-109R	EL 1U 20% 200V
C606	28H37-471R	EL 470U 20% 16V	C722	28H67-470R	EL 47U 20% 50V
C607	28H37-470R	EL 47U 20% 16V	C801	28H37-101R	EL 100U 20% 16V
C608	39147-103R	CE 0.01U 20% 50V	C802	31115-472R	PEI 4700P 5% 50V
C609	28H37-470R	EL 47U 20% 16V	C803	29176-109R	TA 1U 10% 35V
C610	39147-103R	CE 0.01U 20% 50V	C804	28H57-3311	EL 330U 20% 35V
C611	28H37-470R	EL 47U 20% 16V	C805	28H57-101R	EL 100U 20% 35V
C612	39147-103R	CE 0.01U 20% 50V	C806	38196-100R	CE 10P 10% 50V
C621	28H37-331R	EL 330U 20% 16V	C807	28H47-220R	EL 22U 20% 25V
C622	39B87C104R	CE 0.1U 20% 50V	C808	28H47-2225	EL 2200U 20% 25V
C623	39B87C104R	CE 0.1U 20% 50V	C809	28H57-101R	EL 100U 20% 35V
C625	38115-820R	CE 82P 10% 50V NPO	C810	28H67-479R	EL 4U7 20% 50V
C626	28H07-100R	EL 10U 20% 160V	C811	28H37-220R	EL 22U 20% 16V
C627	39487-103R	CE 0.01U 20% 500V	C812	28H37-101R	EL 100U 20% 16V
C628	39B87C104R	CE 0.1U 20% 50V	C813	28HA7-2201	EL 22U 20% 200V
C630	38115-820R	CE 82P 10% 50V NPO	C814	28437-470R	EL 47U 20% 16V
C631	28H07-100R	EL 10U 20% 160V	C815	28H37-101R	EL 100U 20% 16V
C632	39487-103R	CE 0.01U 20% 500V	C817	28H47-101R	EL 100U 20% 25V
C633	39B87C104R	CE 0.1U 20% 50V	C818	28H67-109R	EL 1U 20% 50V
C635	28H07-100R	EL 10U 20% 160V	C819	28H67-109R	EL 1U 20% 50V
C636	39487-103R	CE 0.01U 20% 500V	C820	39B87C104R	CE 0.1U 20% 50V
C638	28H07-100R	EL 10U 20% 160V	C821	39146-222R	CE 2200P 10% 50V
C640	39687-1038	CE 0.01U 20% 2KV	C902	28457-479R	EL 4U7 20% 35V
C641	38115-560R	CE 56P 10% 50V NPO	C903	39B87C104R	CE 0.1U 20% 50V
C645	39147-103R	CE 0.01U 20% 50V			